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60/564,105 21 April 2004 (21.04.2004) US(71) Applicants (for all designated States except US): **THE BRIGHAM AND WOMEN'S HOSPITAL, INC.** [US/US]; 75 Francis Street, Boston, MA 02115 (US). **BETH ISRAEL DEACONESS MEDICAL CENTER, INC.** [US/US]; 330 Brookline Avenue, Boston, MA 02215 (US).

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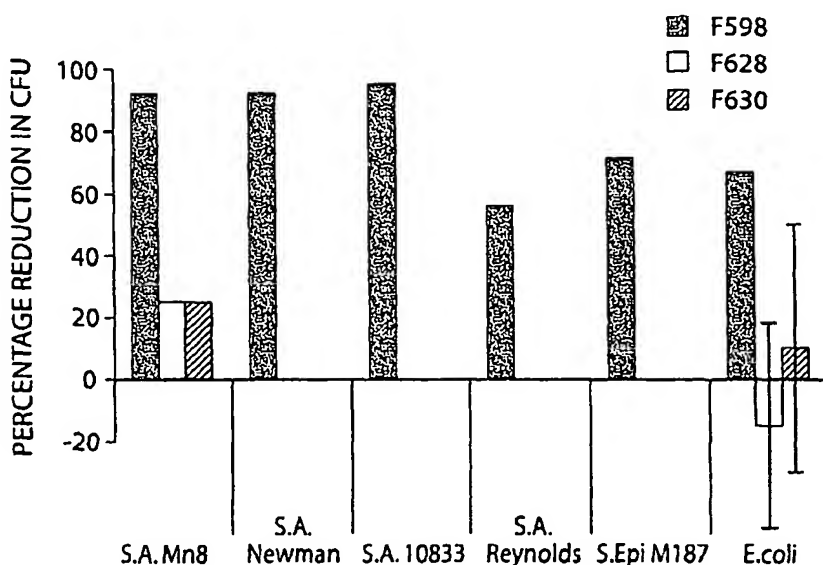
(81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SM, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.

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Published:

— with international search report

[Continued on next page]

(54) Title: **POLY-N-ACETYL GLUCOSAMINE (PNAG/DPNAG)-BINDING PEPTIDES AND METHODS OF USE THEREOF**(57) Abstract: The present invention relates to peptides, particularly human monoclonal antibodies, that bind specifically to poly-N-acetyl glucosamine (PNAG), such as *Staphylococcal* PNAG, in acetylated, partially acetylated and/or fully deacetylated form. The invention further provides methods for using these peptides in the diagnosis, prophylaxis and therapy of infections by bacteria that express PNAG such as but not limited to *Staphylococci* and *E. coli*. Some antibodies of the invention enhance opsonophagocytic killing and *in vivo* protection against bacteria that express PNAG such as but not limited to *Staphylococci* and *E. coli*. Compositions of these peptides, including pharmaceutical compositions, are also provided, as are functionally equivalent variants of such peptides.



— before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

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16 February 2006

# INTERNATIONAL SEARCH REPORT

Int. Application No  
PC1/US2005/013694

<b>A. CLASSIFICATION OF SUBJECT MATTER</b> C07K16/12 A61K39/085		
According to International Patent Classification (IPC) or to both national classification and IPC		
<b>B. FIELDS SEARCHED</b> Minimum documentation searched (classification system followed by classification symbols) C07K A61K		
Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched		
Electronic data base consulted during the international search (name of data base and, where practical, search terms used) EPO-Internal, WPI Data, Sequence Search, BIOSIS, EMBASE		
<b>C. DOCUMENTS CONSIDERED TO BE RELEVANT</b>		
Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 00/03745 A (THE BRIGHAM AND WOMEN'S HOSPITAL, INC) 27 January 2000 (2000-01-27) abstract; claims 95-98 -----	1-115
X	KOJIMA Y ET AL: "ANTIBODY TO THE CAPSULAR POLYSACCHARIDE/ADHESION PROTECTS RABBITS AGAINST CATHETER-RELATED BATEREMIA DUE TO COAGULASE-NEGATIVE STAPHYLOCOCCI" JOURNAL OF INFECTIOUS DISEASES, CHICAGO, IL, US, vol. 162, no. 2, August 1990 (1990-08), pages 435-441, XP000867597 ISSN: 0022-1899 abstract ----- -/--	1-115
<input checked="" type="checkbox"/> Further documents are listed in the continuation of box C. <input checked="" type="checkbox"/> Patent family members are listed in annex.		
* Special categories of cited documents : * A* document defining the general state of the art which is not considered to be of particular relevance * E* earlier document but published on or after the international filing date * L* document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified) * O* document referring to an oral disclosure, use, exhibition or other means * P* document published prior to the international filing date but later than the priority date claimed * T* later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention * X* document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone * Y* document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art. * &* document member of the same patent family		
Date of the actual completion of the international search 14 December 2005		Date of mailing of the international search report 02/01/2006
Name and mailing address of the ISA European Patent Office, P.B. 5618 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016		Authorized officer Favre, N

## INTERNATIONAL SEARCH REPORT

International Application No  
PCT/US2005/013694

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT		
Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	LEE JEAN C ET AL: "Protective efficacy of antibodies to the Staphylococcus aureus type 5 capsular polysaccharide in a modified model of endocarditis in rats" INFECTION AND IMMUNITY, vol. 65, no. 10, 1997, pages 4146-4151, XP002359005 ISSN: 0019-9567 abstract	1-115
X	MAIRA-LITRAN T ET AL: "Immunochemical Properties of the Staphylococcal Poly-N-Acetylglucosamine Surface Polysaccharide" INFECTION AND IMMUNITY, AMERICAN SOCIETY FOR MICROBIOLOGY, WASHINGTON, US, vol. 70, no. 8, August 2002 (2002-08), pages 4433-4440, XP002980605 ISSN: 0019-9567 abstract	1-115
X	WO 03/085093 A (HUMAN GENOME SCIENCES, INC; BAKER, KEVIN, P; ALBERT, VIVIAN, R; CHOWDH) 16 October 2003 (2003-10-16) sequence 94	85,86
X	MAIRA-LITRAN T ET AL: "Biologic properties and vaccine potential of the staphylococcal poly-N-acetyl glucosamine surface polysaccharide" VACCINE, BUTTERWORTH SCIENTIFIC, GUILDFORD, GB, vol. 22, no. 7, 17 February 2004 (2004-02-17), pages 872-879, XP004487441 ISSN: 0264-410X the whole document	1-115
P,X	WO 2004/043407 A (THE BRIGHAM AND WOMEN'S HOSPITAL, INC) 27 May 2004 (2004-05-27) page 26 - page 32; claims 1-133	1-115
P,X	WO 2004/043405 A (THE BRIGHAM AND WOMEN'S HOSPITAL, INC) 27 May 2004 (2004-05-27) the whole document	1-115

# INTERNATIONAL SEARCH REPORT

tional application No.

PCT/US2005/013694

## Box No. I Nucleotide and/or amino acid sequence(s) (Continuation of Item 1.b of the first sheet)

1. With regard to any nucleotide and/or amino acid sequence disclosed in the international application and necessary to the claimed invention, the international search was carried out on the basis of:
  - a. type of material
    - ☒ a sequence listing
    - ☐ table(s) related to the sequence listing
  - b. format of material
    - ☒ in written format
    - ☒ in computer readable form
  - c. time of filing/furnishing
    - ☒ contained in the international application as filed
    - ☐ filed together with the international application in computer readable form
    - ☒ furnished subsequently to this Authority for the purpose of search
2. ☒ In addition, in the case that more than one version or copy of a sequence listing and/or table relating thereto has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.
3. Additional comments:

## INTERNATIONAL SEARCH REPORT

International application No.  
PCT/US2005/013694

### Box II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This International Search Report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☒ Claims Nos.:  
because they relate to subject matter not required to be searched by this Authority, namely:  
Although claims 45-84 and 105-115 are directed to a method of treatment of the human/animal body, the search has been carried out and based on the alleged effects of the compound/composition.
2. ☐ Claims Nos.:  
because they relate to parts of the International Application that do not comply with the prescribed requirements to such an extent that no meaningful International Search can be carried out, specifically:
3. ☐ Claims Nos.:  
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

### Box III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

1. ☐ As all required additional search fees were timely paid by the applicant, this International Search Report covers all searchable claims.
2. ☐ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this International Search Report covers only those claims for which fees were paid, specifically claims Nos.:
4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this International Search Report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

#### Remark on Protest

- ☐ The additional search fees were accompanied by the applicant's protest.
- ☐ No protest accompanied the payment of additional search fees.

# INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/JP2005/013694

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
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WO 2004043407	A	27-05-2004	AU 2003290867 A1 EP 1583517 A2	03-06-2004 12-10-2005
WO 2004043405	A	27-05-2004	AU 2003295520 A1 BR 0316018 A CA 2501077 A1 EP 1565478 A2	03-06-2004 20-09-2005 27-05-2004 24-08-2005